March 26, 1963 T. ZBIKOWSKI 3,082,427

SAFETY HELMET

Filed May 19, 1960 2 Sheets-Sheet 1

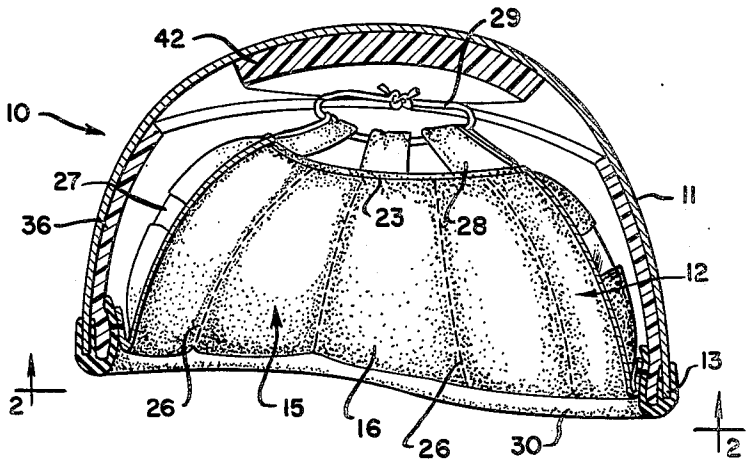


Fig. 1

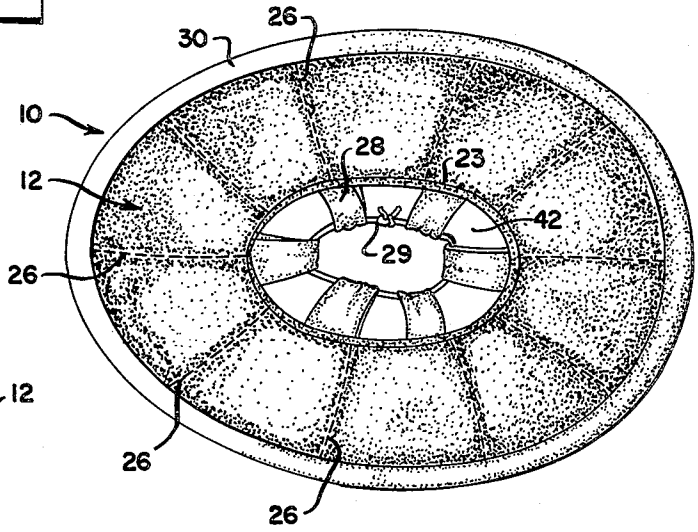


Fig. 2

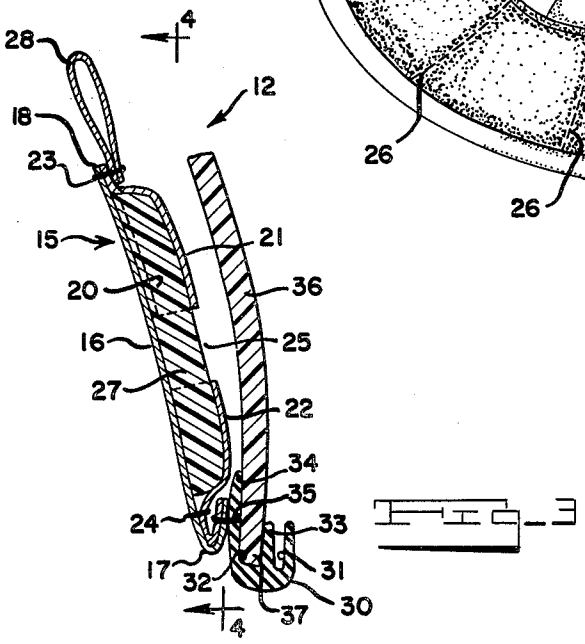


Fig. 3

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SAFETY HELMET

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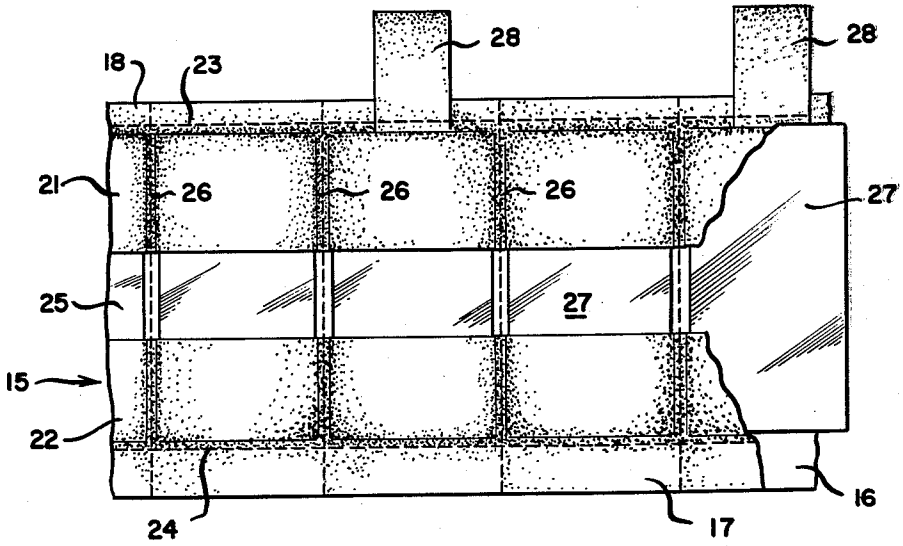


Fig. 4

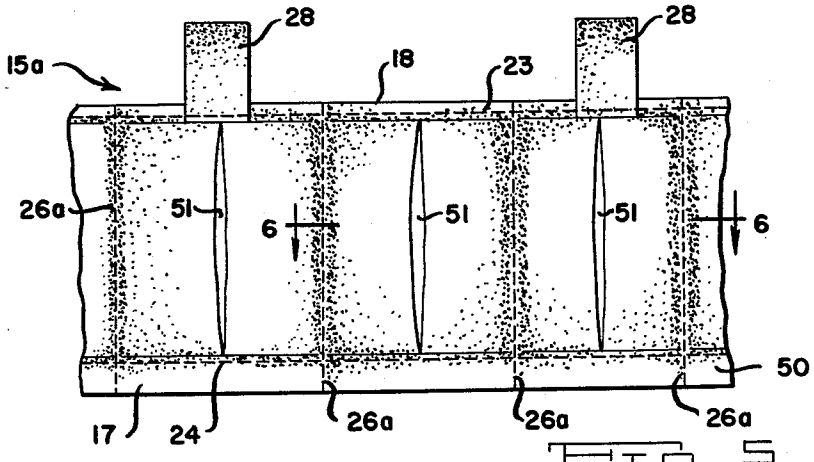


Fig. 5

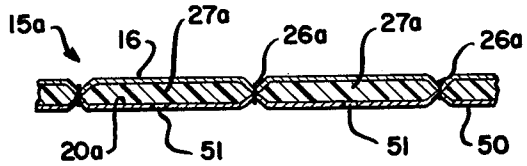


Fig. 6

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SAFETY HELMET

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Filed May 19, 1960, Ser. No. 30,277
3 Claims. (Cl. 2—3)

This invention relates to safety helmets and more particularly to a unitized liner formed as the interior of the shell of a safety helmet.

Safety helmets are generally formed of an exterior inverted bowl-like shell shaped to fit over the human head and some kind of support means within the shell to support the shell upon the head. The interior support or lining generally has been formed out of a number of separate pieces which were individually secured to the shell. These are expensive and difficult to assemble and thereby raise the overall cost of the helmet. Also at times, these pieces fail to work together as a unit to protect the wearer's head to the maximum degree possible.

Thus, the object of this invention is to form a safety shell having an interior liner formed as a unit, with all the parts secured together and simply attached to the shell in one simple operation by means of fitting the bottom edge of the shell into a single channel of the edge band.

A further object of this invention is to form a single unit liner which is so padded as to flexibly package the human head and distribute any load or blow upon the helmet uniformly to the human head to thus prevent damage to the head.

These and other objects and advantages of this invention will become apparent upon reading the following description of which the attached drawings form a part.

In these drawings:

FIG. 1 is a cross-sectional elevation of the shell and liner forming the helmet.

FIG. 2 is a bottom view taken in the direction of arrows 2—2 of FIG. 1.

FIG. 3 is an enlarged cross-sectional view of the interior liner assembly, and

FIG. 4 is a view of a portion of the padded strip, per se, as if taken in the direction of arrows 4—4 of FIG. 3.

FIG. 5 shows a modification of a portion of the liner strip before assembly.

FIG. 6 is a cross-sectional view taken on arrows 6—6 of FIG. 5.

As shown in the drawings, and particularly FIG. 1, the helmet 10 is formed of two separate units, namely, a shell 11 and an interior liner assembly 12. The shell is a thin wall, inverted, bowl-shape having an open bottom defined by a bottom edge 13. It is preferably formed of a rigid material having great strength, such as a fibrous glass reinforced plastic resin which is rigid and capable of sustaining heavy loads without breaking. Various types of resins are well-known in the art for this purpose and hence, no description of the particular plastic selected is needed, it being sufficiently understood that the shell is of great strength and is formed of a single thin wall.

The liner assembly 12 is formed of a number of separate elements which are joined together prior to assembly with the shell. These elements include a padded liner strip 15 (see FIGS. 3 and 4) which is formed of an elongated, relatively narrow strip of cloth or cloth-like material 16 whose opposite ends are joined together to form an endless band. It has a bottom elongated edge 17 and a top elongated edge 18.

As shown in FIGS. 4 and 5, the strip 16 is overlapped on its outer face with a pair of elongated strips, namely, upper strip 21 and lower strip 22, which together form pockets 20. The upper strip 21 has a top edge secured

by continuous stitching 23 to the top edge 18 of the strip 16. Its bottom edge is spaced above the center of the strip 16. The lower strip 22 has its bottom edge stitched continuously at 24 to the bottom edge 17 of the strip 16.

It can be seen in FIG. 4, that the free edges of the strips are spaced apart so that together they form pockets wherein the openings of the pockets are at the center of the strip 16 and are relatively wide. The individual pockets 20 are further defined by vertical rows of stitches 26 which rows are spaced apart a sufficient distance to form one pocket between each pair of rows 26.

Within each pocket is a slab 27 formed of a resilient, relatively thick material such as sponge or foam rubber or foamed polyethylene or some such similar resilient but relatively light weight material. The slabs are fitted into their respective pockets through the center openings thereof and may be flexed within their pockets because of the freedom given by the wide center openings. Also, the slabs may be easily removed and replaced when desired.

A plurality of spaced apart loops 28 are stitched to the top edge 18 of the strip 16. The loops may be formed of cloth and are formed to receive a drawstring 29 for gathering the top edge 18 together.

Means for securing the padded liner strip 15 to the shell is provided in the form of an elongated edge band 30 shaped in cross-section as a double channel (see FIG. 3) having an outside channel 31 and an inside channel 32 with a common leg 33 between the two channels and an inside leg 34. The bottom edge 17 of the liner 15 is stitched continuously by one or more rows of stitches to the inside leg 35. The ends of the band 30 are joined together, as for example, by a suitable adhesive, so as to form a continuous band.

An elongated, relatively thick, sheet 36 of a resilient material, such as foamed polyethylene or sponge rubber or the like is arranged with its bottom edge 37 fitted into the inside channel 32. The sheet 36 is of sufficient length to surround the outside padded face of the liner strip 15. A suitable adhesive may be used to hold the bottom edge 37 within the channel 32.

After the liner assembly parts are joined together as mentioned above to form a complete unit, it is ready for attachment to the shell. Prior to attachment the draw spring 29 may be passed through the loops 28 and its ends tied together in order to gather the loops together and thus gather the top edge 18 of the liner strip 15 together at a location just below the top of the shell.

Thereafter, the shell bottom edge 13 is inserted into the outside channel 31 of the edge band 30 and is held therein by means of a suitable adhesive.

Thus, the final assembly consists merely of pushing the bottom edge 13 of the shell into the outside channel 31 and this can be very easily accomplished. Where the inside liner is damaged or the shell is damaged and it is desired to replace one or the other, they can be disassembled simply by tearing them apart and replacing either the shell or the inside liner unit, as the case may be.

It can be seen, that the sheet 36 is arranged in face to face contact against the inside face of the shell wall and is positioned between the shell and the padded face of the liner strip 15.

The edge band 30 is preferably formed of a resilient material such as rubber or a resilient plastic. In case of a blow to the helmet, it serves to act as a spring to absorb the impact as the shell is forced down and the liner is forced up within the helmet. Being resilient, it is spring-like and hence, absorbs a great deal of the shock.

Preferably, a top pad 42 is arranged above the liner assembly in contact with the wall of the shell (see FIG. 1). This pad 42 may be some resilient material such as rubber or foamed plastic or the like, and provides addi-

tional protection for the top of the wearer's head if a blow to the helmet is hard enough to cause the head to strike the top of the shell.

As can be seen, the shell, while shaped to fit a human head, is considerably larger than the head and would normally be spaced a considerable distance from the head. The liner strip **15** would actually fit right around the head as if it were an interior hat with the sheet **16** in contact with the head and the padding on the outside.

In case of a shock or blow to the helmet, the strip **15** functions to distribute the load evenly around a wide circumferential band, to thereby squeeze the head circumferentially, and hence, distribute the load and prevent damage to the head. The padding on the outside, that is, the pockets which are filled with the padding or slabs, cushions and distributes the blow. The resilient sheet **36** also further cushions against the blow as the liner strip **15** may move against one part or another of the shell wall in response to a blow.

FIGS. 6 and 7 show a modified strip **15***a*, similar to that shown in FIG. 3. Here, a strip **50** is secured to the cloth material **16** and is periodically slitted vertically at **51** to form the openings for the pockets **20***a*. The pockets are separated by vertical lines of stitching **21***a* and are filled with the resilient slabs **27***a*. Hence, instead of horizontal openings to the pocket as in the case of the modification shown in FIG. 3, the openings to the pockets are in the form of vertical slits.

It can be seen, that the entire liner assembly can be put together prior to inserting it in the shell, and hence, can be easily fabricated on an ordinary sewing machine and requires only a minimum amount of labor to assemble. The liner asembly and the shell are put together simply by placing a small quantity of some suitable adhesive into the outside channel **31** of the edge band **30** and then pressing the shell edge **13** into channel **31**.

The small slabs of resilient material within the pockets make it possible to replace any damaged slabs without taking the whole liner apart and throwing it away, and also make it possible to use what might otherwise be scrap material, since small size pieces of foam material normally are not useful for this purpose.

This invention may be further developed within the scope of the following attached claims. Accordingly, it is desired that the foregoing description be read as being merely illustrative of an operative embodiment of this invention and not in a strictly limiting sense.

I now claim:

1. A liner unit for a safety helmet shell formed of a rigid, thin wall, inverted, bowl-like shape formed to fit over a human head and having an open bottom defined by a continuous bottom edge, said liner comprising an elongated, horizontally arranged, padded strip having its ends joined to form a continuous band corresponding in length to the length of the shell bottom edge and of a height to fit within the shell from the bottom edge a substantal distance towards the top of the shell, an elongated edge band formed of a resilient material and being formed of three upwardly extending spaced apart legs to form a double channel shape in cross-section with both channels being upwardly open and the center leg of the three legs being the common wall for both channels, said strip being secured to one of the outside legs, a sheet of thick resilient material of substantially the same length as the strip having a bottom edge continuously inserted into and held within the channel formed by the leg to which the strip is secured and the center leg and the sheet forming a band surrounding the outside face of the band formed by the strip, the remaining channel being formed to receive the entire bottom edge of a shell for securing the edge band and strip as a unit to the shell.

2. A safety helmet comprising a rigid, thin walled shell formed in an inverted bowl-like shape having a continuous bottom edge defining the bottom opening of the bowl-like shape and the shell being shaped to fit over a human head but being of a size to be spaced a considerable distance away from the human head at all points thereof, an edge band formed of a double channel shape, namely an outside channel which receives the shell bottom edge and an upwardly opening inside channel having a common leg with the outside channel, the entire bottom edge of the shell being fitted into the outside channel and being adhesively secured therein, the common leg being in continuous contact with the inside face of the shell wall and with the second leg defining the inside channel being spaced a short distance from the inside face of the shell wall, a liner comprising an elongated, padded strip of material having horizontal, elongated, top and bottom edges and having its ends joined together to form a continuous liner band, the entire length of the bottom edge of said strip being sewn to said second leg of the edge band, and an elongated sheet of relatively thick, resilient material having a bottom edge fitted into the inside channel with the sheet forming a band surrounding the liner band formed by the strip and located between the strip and the shell and normally being in face to face contact with the shell wall.

3. A safety helmet comprising a rigid, thin walled shell formed as an inverted bowl-like shape having a continuous bottom edge defining the bottom opening of the bowl-like shape and the shell being shaped to fit over a human head but being of a size to be spaced a considerable distance away from the human head at all points thereof, and an edge band formed of an upwardly opening double channel shape, namely an outside channel which receives the shell bottom edge and an inside channel having a common leg with the outside channel, the entire bottom edge of the shell being fitted into the outside channel and being secured therein, the common leg being in continuous contact with the inside face of the shell wall and with the second leg defining the inside channel being spaced a short distance from the inside face of the shell wall, a liner comprising a horizontally arranged endless headband fitted within the shell and having a horizontal lower edge; the entire length of the lower edge of the headband being secured to said second leg of the edge band for thereby securing the edge band and the headband as a unit to the shell.

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